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Editorial.

OPERATORS AND OPERATIONS.

PERHAPS the title of "Veterinary Surgeon" given to us as a designation is not a misnomer, and although we occasionally meet a country practitioner who does not do his own castrating, and a town or city man who shies at performing a surgical operation, yet no class concerned in the healing art has a larger proportion of effective operators in its ranks than our own. Almost every day, or at any rate once or twice a week, most of us encounter conditions to remedy or alter which necessitate the use of the knife, scissors, curette, &c. Our patients, too, have to be taken as they come, and besides being of different races and breeds are frequently of varied temperaments. From the vicious and restless bull to the phlegmatic and stolid cart-horse; from the snapping and nervous canine pet of the lady to the brave and uncomplaining bull dog or fox terrier, and even from the scratching and biting cat to the quiet and passive fowl, we may flit within a short time on surgery bent.

All these proceedings put a certain strain on the activity, ability, dexterity, and nerve of the surgeon, and one of the first essentials of the lasting operator is to keep in good bodily health and condition. The smaller animals may be dealt with without so much strain on the system, and for a longer period than the larger; but in order to tackle a resentful or stubborn colt, an awkward cow, or a vicious bull we must be fairly sound in wind and limb. Good eyesight, too, is a vital attribute of the successful operator. The importance of keeping fit, then, has a value none of us should lose sight of.

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Given equal qualities of hand, eye, activity, and intelligence, the man who has the more practice will become more perfect and acquire greater quickness and skill in surgery than he who has the less ; and there are, of course, operations, such as those for roaring, cryptorchidism, removal of the ovaries, Cæsarean section, &c., at which the general practitioner can seldom become very expert.

But, however small or great the procedure to be undertaken, the primary factor in its successful accomplishment will be the operator himself. To be up to date and skilful we must have a good knowledge of anatomy, and to this end the recent books on the regional structures and relations of different parts of the body indicate marked progress. Yet knowledge is no use unless we know how to make it available, and the proper application of clinical and theoretical study is to enable us to determine when to act, to what extent, and when to pursue a policy of masterly inactivity.

Passing nearer to the work the personal hygiene of the commencing operator ought to have due attention. Nowadays we know that asepticism and antisepticism must be practised carefully in order to ensure the best results in surgical work. Hands and clothing of the surgeon must be clean. A fresh wound made by us ought to be kept aseptic and an infected wound treated rendered free from infection by an antiseptic. Personally, we think all instruments before use should be submitted to boiling water for some minutes, and for veterinary surgeons we consider the handiest and most surgically correct way in which to use them is to take them as needed out of an enamel dish containing an antiseptic in solution. For this purpose we know of nothing better than dilute carbolic acid. There are many newer antiseptics, but few handier or more suitable for both instruments and operator. Shaving the skin and the use of iodine ought not to need mention. Without the former asepticism is not likely to be accomplished, and lacking the latter we miss one of our best safeguards.

An intelligent look all around will enable us to see what danger of wound contamination is likely to result from the surroundings of our subject. Carefully to castrate animals on what is practically a manure heap and to leave them there is only courting disaster, and this fact, notwithstanding the boasted spread of education, is often nearly as hard to drive into the head of the owner of an animal as it would be into that of the quadruped himself. The resting place of a patient after an operation should be clean, present and future

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dressings sterile, and the air supply as pure as possible. The application of bandages needs intelligent consideration. As regards quickness of healing, there is much to be said for the free admission of oxygen to a wound.

Antiseptics applied daily must not injure the reparative process by acting deleteriously on the tissues. The advantages of dry dressings (which are bland) to wounds, and which remain longer in contact with the parts than lotions or oils, ought not to be overlooked. In pre-antiseptic days the rule was to keep every wound as dry as possible, and this rule is a good one to-day. The effect of the application of antiseptics in solution is quite commonly over-valued.

In many cases it is impossible to bandage wounds, and the need of a thin, delicate, and reliable antiseptic covering to protect a part from friction, or to keep it as quiescent as possible, has been felt by us. Recently we considered we had a good effect on the end of the tail of a Great Dane, on which we had operated, by painting it with hazeline and dusting it daily with a mixture of powdered Fuller's earth and boracic acid. A mixture of tincture of iodine, benzoin and glycerine might have done just as well. For the rest the merciful surgeon will make a plentiful use of local anæsthetics, such as ethyl chloride, cocaine, eudrenine (eucaine and adrenalin), novocain, quinine and urea hydrochloride. In dogs, the value of morphine sulphate as a general narcotic ought not to be overlooked, and chloroform administration ought to be still more generally adopted in surgical procedure than at present. Styptics are always valuable when operating, and perhaps there will be some advance made in the knowledge of these agents as a result of the war. Some progress ought to be recorded in surgical methods considering the large field in surgery at present open, and research work in the science and art should bring us some valuable and fresh information.

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General Articles.

FOOT-AND-MOUTH DISEASE.

FOOT-AND-MOUTH disease is a contagious eruptive fever caused by a filtrable virus. The term "filtrable virus" is used to describe that class of disease-producing material which is capable of passing through the pores of a bacterial filter. The nature of such viruses is not yet definitely known, but in view of the nature of diseases caused by them it seems probable that they are bacterial. The causal agent of foot-and-mouth disease is probably too small to be seen, even with the aid of the highest powers of the microscope.

ANIMALS SUSCEPTIBLE TO THE DISEASE.

It may be said that practically all the domestic animals and wild ruminants can be infected with foot-and-mouth disease. This statement, however, requires a certain amount of qualification. Bovine animals are usually looked upon as more susceptible to the disease than sheep, pigs, and goats; but the experience in Great Britain during the last few years has been that, given an outbreak amongst pigs or sheep, the disease spreads as rapidly as in the case of cattle. Human beings may also contract foot-and-mouth disease, though they are not in the first line of susceptibility. Horses, dogs, and cats have occasionally been known to contract the disease under natural conditions, but owing to the resistance they show to inoculation with the virus, and the infrequency of naturally contracted attacks of the disease amongst them, they must be considered much less susceptible than cattle, pigs, or sheep.

The degree of susceptibility varies considerably even amongst susceptible animals, and it has been observed not infrequently that certain animals appeared to resist infection when their fellows were suffering from the disease.

SYMPTOMS.

The duty of an owner is to suspect the disease. The symptoms are described here to enable owners to suspect the disease, and not with the object of encouraging them to attempt to differentiate between foot-and-mouth disease and other diseases with somewhat similar symptoms. Foot-and-mouth disease is so serious to stock-owners in general, that, if there is the least suspicion, it should be

reported immediately to the authorities. (See last section of this article on "Reporting the Existence of the Disease.")

The incubation period by natural infection is from forty-eight to seventy-two hours to ten days, but the shorter periods are the more usual.

The chief symptoms of the disease are common to all affected animals, although the effects of the virus vary somewhat. In the initial stage the animals are dull, off their food, and if the temperature is taken, it will be found to be higher than normal—105° F., or even higher in cattle. At this stage, however, it is unlikely that a farmer would suspect the existence of foot-and-mouth disease.

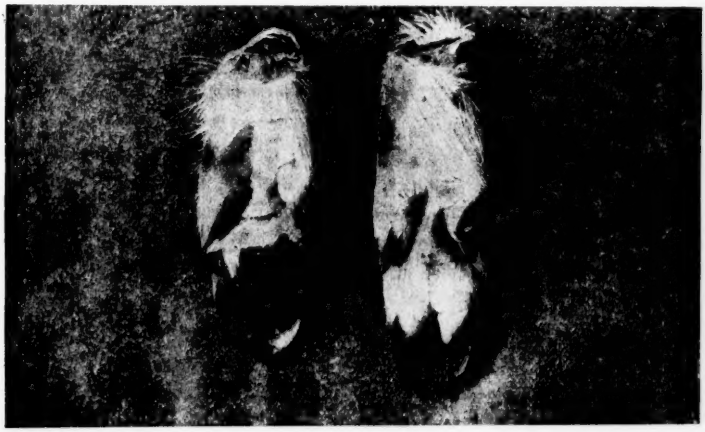

FIG. 1.—Feet of a pig affected with foot-and-mouth disease. The vesicles have ruptured and the horn is separating.

The first symptoms of this disease to attract the farmer's attention are the sudden appearance of lameness, or slavering at the mouth or both. Lameness in a number of animals, especially if present in more than one species—cattle and pigs, or sheep, for example—should arouse the gravest suspicion. Salivation (slavering) in a number of animals, or even in one animal, should always be looked upon with suspicion, and should lead to an examination of the mouth. In affected cattle salivation is very frequently accompanied by a smacking or sucking sound, which is a very characteristic symptom of the disease. Slavering, however, is not nearly so noticeable in pigs and sheep as in cattle, and it is usually sudden

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lameness which first attracts attention in the first two. It is to be noted, also, that the lameness might escape the casual observer, as the animals are often so footsore that they retain the recumbent position. Cattle, however, when moving frequently shake their feet, as if trying to remove a foreign body. Sheep, of course will usually rise and move away when approached. If not, it probably means that their feet are very tender.

The lesions of the disease consist of vesicles or blisters which appear on the mucous membranes, especially that of the mouth, and and on the finer parts of the skin. In the mouth they are located on the pad, on the inside of the lip, and on the tongue. About the feet they are usually found around the coronet, at the junction of the skin with the hoof, at the base of the supernumerary digits, and on the soft tissue between the clays. They are also commonly found on the teats in females. Less commonly they may be seen around the muzzle, inside the vagina, and in pigs on the skin of the body. The vesicles vary in size and shape ; quite commonly they are an inch in length, but they may be much smaller. They are easily ruptured by manipulation. When ruptured, a limpid fluid exudes, the mucous membrane over the vesicle looks ragged, and the under surface has a very red or raw appearance, which afterwards becomes yellow. On parts like the pad, where the mucous membrane is dense, the affected part of the mucous membrane may be much thickened, and may remain attached after rupture of the vesicle. On manipulation, this thickened portion of membrane comes away in the form of leathery-looking tissue, leaving a raw surface. About the feet the vesicles are similar to those in the mouth, except that the covering is denser. Cattle at pasture often show rapid emaciation when attacked, as, owing to the pain in their mouths and feet, they are unable to obtain sufficient nourishment. In milch cows the milk yield falls considerably, and when the teats are affected injury of a permanent nature may arise in the udder. The inflammatory process in the feet may lead to shedding of the horny parts. Such accidents arise in the later stages of the disease, and they are more commonly seen in sheep and pigs. Even in the earlier stages the horn can frequently be seen separating around the coronet in a downward direction in sheep and pigs. Very young calves may die from enteritis (inflammation of the bowel) without showing eruptive symptoms externally.

Animals usually recover from foot-and-mouth disease, but the

loss, owing to depreciation, loss of milk, or permanent injury, is considerable. Some outbreaks, however, are more virulent than others, and in a very virulent outbreak a considerable number of animals may die, usually from intestinal complications.

Infection.

The contents of the vesicles are infective, and it follows that material contaminated thereby, such as saliva, hides, foodstuffs, litter,

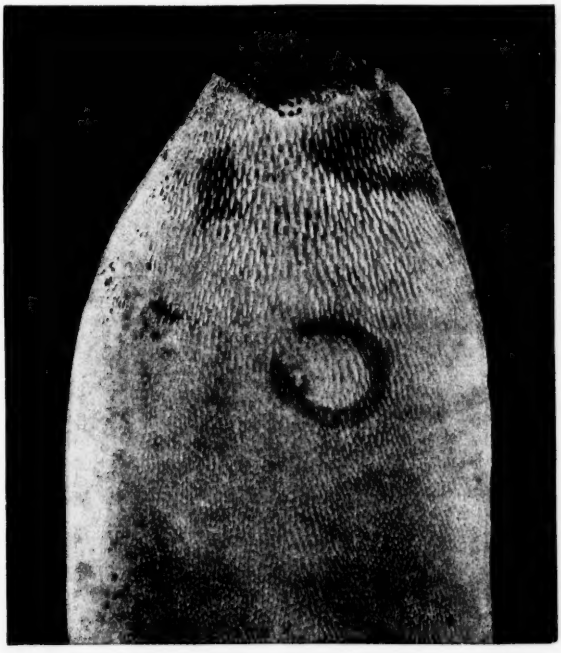

Fig. 2.—Portion of the tongue of an ox, showing early lesions of foot-and-mouth disease. The tip of the tongue shows a recently ruptured vesicle, while lower down an unruptured vesicle is seen.

dung, and milk, will also be infective. The blood has only been found infective in the earliest stages of the disease.

The virus of this disease is easily destroyed by antiseptics, and by such natural processes of disinfection as desiccation and sunlight. There can be no doubt, however, that under certain conditions which exist in nature, but which are not fully known, the virus may

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remain active for months, and be carried long distances. This probably accounts for the mysterious outbreaks which have occurred in Great Britain without apparent relation to a previous case. A comparatively low temperature—55° to 70° C. (131° to 158° F.)—destroys the virus. Infection is spread from animal to animal by cohabitation in stables or on the pastures, by the hands of milkers, or by the hands, boots, or clothes of other attendants. It may be carried considerable distances on foodstuffs, and through a water supply being contaminated. When an animal is salivating, the threads of saliva and straws contaminated thereby may be blown a considerable distance by the wind, and thus reach other animals, or a watercourse from which they drink. The roads along which affected animals have passed, and the wagons in which they have travelled, may remain infective for some time. Rats, fowls, birds, cats, horses, and dogs may act as mechanical carriers of infection, and the last three species have occasionally been known to contract the disease. It is also conceivable that human beings affected with the disease might convey it to animals. The spread of infection from place to place is most insidious. A good deal of evidence has been collected which goes to show that a human being may, through his garments, render the clothes of others infective. There is also a considerable amount of evidence that some animals which have recovered from the disease may be infective to others for a considerable time after recovery. The virus enters the body through the mucous membranes, and probably the commonest method of infection is by way of the alimentary tract. A very small amount of the material from the vesicles ($\frac{1}{1000}$th of a drop) has been found sufficient to cause infection.

Prevention.

It is not intended under this heading to deal with prevention in the sense of administering so-called preventive drugs, or resorting to preventive inoculation. There is no drug known which renders an animal resistant to foot-and-mouth disease, and science has not so far provided a practical method which can be used to immunize animals artificially. If the disease breaks out on any premises it is the duty of the owner to take all reasonable measures to prevent the affected or suspected animals, and those in immediate association with them, from coming in contact with those of his neighbours. The stock should be kept away from a public road, from a water supply

which reaches other farms, and from boundary fences immediately beyond which other stock are pastured. The attendants should be warned not to go amongst other cattle, sheep, goats, or pigs, and all

FIG. 3.—Tongue of an ox affected with foot-and-mouth disease, showing two recently ruptured vesicles and a considerable amount of scaling of the epithelial covering at other parts.

those who have to leave the premises should disinfect their boots before doing so, otherwise they may carry infective material on to

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the roads or elsewhere. The boots should be scraped to remove particles of manure, and afterwards they should be swabbed with an ordinary disinfecting solution. If such is not available a saturated solution of common salt in hot water may be used. Milk should not be allowed to leave the premises, nor should it be given to other animals on the premises unless it has been previously boiled. Dogs and poultry should not be allowed to roam at large. The above precautions apply mainly to the owners of infected premises and any persons for whom they are responsible. It may happen, however, that other owners or their employés may find themselves on suspected premises before an outbreak has been declared. In such circumstances they should carry out the above-mentioned measures of disinfection, and they should refrain from attending to other animals until they have further disinfected their hands and changed their boots and clothes.

Reporting the Existence (or Suspected Existence) of the Disease.

The attention of stockowners is directed to Section 4 of the Diseases of Animals Act, 1894, and Article 1 of the Foot-and-mouth Disease Order of 1895, which in effect provide that every person having, or having had, in his possession or under his charge an animal affected with or suspected of foot-and-mouth disease shall, with all practicable speed, give notice to a police constable.

The object of immediately reporting any suspicious case is to enable the authorities at once to have inquiry made, and if disease is found to exist to isolate it and stamp it out before it can extend throughout the country. As the result of the disease spreading in 1869, it persisted in Great Britain until 1872, and it is estimated that 3,000,000 animals were attacked. An estimate was made of the losses sustained from the disease between 1870 and 1877 in Northumberland and Westmorland alone; in that period there were 9,035 outbreaks in these two counties, 236,755 animals were involved, and the loss approximated to £301,400.

The disease spread again in 1881-1884. In Great Britain 26,484 outbreaks occurred and 710,362 animals became affected, of which 9,361 died and 5,874 were slaughtered.

Figs. 1 and 3 are from the Report of the Departmental Committee on Foot-and-mouth Disease (Cd. 7270, price 4½d.).—Reproduced by permission from the *Journal of the Board of Agriculture*.

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COCCIDIOSIS IN POULTRY AND GAME BIRDS.

By H. B. FANTHAM, D.Sc.Lond., B.A.Cantab.

Coccidiosis in poultry and game birds has been known for many years to poultry raisers and game preservers under various names. These include "white scour," "scour," "white diarrhœa," "bowel trouble" and "enteritis," while more recently the malady has been described in current literature under its correct name coccidiosis. The disease in turkeys is known as "blackhead," and in some districts outbreaks among fowls are referred to as the "blue-head complaint." The disease is infectious, and has been responsible for considerable losses in poultry and game, not only in England but in different parts of Europe and in North America.

The cause of the disease is a minute animal parasite, named *Eimeria* (*Coccidium*) *avium*, that lives and multiplies within the lining of the alimentary canal of the bird infected, whereby the cells lining that part of the food passage in which the bulk of the digestion goes on are destroyed. The parasite in one stage is passed from the bird with its droppings, and, should these contaminate the food or drink swallowed by another bird, the second bird also becomes infected.

Hosts Infected.

Numerous birds can harbour the parasite, and the malady may be spread from one kind to another by the excrement of those which are infected.

The chief hosts infected in England are fowls, turkeys, pigeons, geese, ducks, pheasants, partridges and grouse. A disease due to an allied organism, *Eimeria stiedæ*, occurs in rabbits and hares, producing an affection of the gut and also of the liver. The rabbit parasite is not communicable to birds.

Coccidiosis is most common among young birds, but mature birds may contract the disease with fatal results. Some birds seem to recover, but actually remain infected, though the parasites present are relatively few and do not seem to cause the host much inconvenience. These birds are, therefore, "chronics," and serve as an insidious means of spreading the disease to chicks they may rear, as well as constituting a danger to other birds with which they may associate.

Symptoms.

The symptoms of coccidiosis of fowls, pigeons, turkeys, and ducks, as well as of game birds (many of which are hand reared), are

identical. Domestic poultry, when first infected by way of their food and drink, stand about much more than healthy normal chicks, droop their wings and utter plaintive cries. They eat and drink far more greedily than normal birds, but in spite of this they rapidly become thinner, the muscles of the breast and legs showing this more particularly. The loss of weight is striking. One instance is that of two fowl chicks, each of which weighed 7½ oz. when one became infected. Two months later the infected chick died, its weight being 5 oz. The weight of the sister chick that had received exactly the same kind of food was then 1 lb. 6 oz. Many other instances of a similar nature have been observed.

In addition to loss of weight infected birds became markedly anæmic, the comb, wattles and cere becoming pale and bloodless. The feathering also is weak compared with that of healthy birds. The leg feathering is often ragged, the quills are less rigid, the sheen on the feathers is less developed, and the replacement of nestling down by ordinary feathers is much retarded.

Owing to the attack of the parasite on the mucous membrane lining the alimentary canal, digestive troubles arise, and the fæces of the bird become much altered in consequence, so that they serve as an indication of infection. The "soft droppings" of the bird come from the "blind guts" or cæca, and form a cap on top of the coarser food waste coming from the bowel. In healthy birds, the cæcal droppings are relatively firm, but in infected ones they become much more fluid, and are diarrhœtic in character. They are also much paler in colour, at times approaching pale yellow, or, if contaminated with a little of the kidney secretion, white—hence the name "white diarrhœa."

Occasionally infected birds have a discharge of whitish material from the mouth and nostrils, and even the eyes and ears. A foul smell also is noticed on opening the beak. The heads of turkeys and fowls, and of some other birds, such as grouse, may take on a bluish tint. These features are not universal.

Death from coccidiosis is often sudden, and the birds may be feeding greedily half an hour before they die of the disease. The sudden death of chicks from coccidiosis in the open is often responsible for the spring dwindling that seems so mystifying in the case of game birds, and in some cases coccidiosis is responsible for the death of young chicks and ducklings, where the disappearance has been ascribed to rats.

Distribution of the Parasite in the Host.

Eimeria (*Coccidium*) *avium* is a small parasite endowed with a great capacity for existence under unfavourable conditions for long periods and with an enormous capacity for penetrating, multiplying within, and destroying the delicate mucous membrane of the alimentary tract of its host. The whole food tract is not infected as a rule, but cases have been known in which every part of the intestine has been literally riddled with parasites and reduced to a pulp. The most important digestive processes in the bird occur in the duodenum, that part of the small intestine immediately connected with the gizzard, and the duodenum is one of the most heavily infected parts of the food canal. The parasites multiply in the tissue of the duodenum, break through into its cavity, and then pass along the food canal usually until they reach the paired cæca, or "blind guts." Here a suitable environment is reached again, the parasites penetrate the lining and active multiplication begins again. The invaded cæca become very thin while their blood-vessels are greatly engorged, as are those of the mesentery. At the same time the cavities of the cæca become much distended. The hind gut or rectum, which serves chiefly for the collection and consolidation of excrement prior to its expulsion from the body, is rarely infected by the parasite.

In turkeys that have been infected for some time some of the parasites leave the duodenum, pass up the bile duct, and enter the liver. They behave there as in the intestine, and form masses which have a whitish, cheesy appearance, and suggest tubercle. On pressure or puncture a thick milky fluid or a whitish cheesy mass exudes. A similar condition is seen in the livers of rabbits affected with coccidiosis, and in all the cases, the contents of such areas in the liver consist of masses of the resistant forms of the parasites that are destined to reproduce the infection in new hosts. Sometimes the livers of fowls infected with chronic coccidiosis show the same appearance as those of turkeys. Liver infection occurs more usually in adult than in young birds.

The Life-history of Eimeria (Coccidium) Avium.

If a very small portion of the excrement of an infected bird be examined microscopically, a number of small, oval, shining bodies mingled with food *débris* are seen (fig. 1). The small oval bodies

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are about $\frac{1}{40}$-$\frac{1}{25}$ millimetre long and $\frac{1}{60}$-$\frac{1}{50}$ millimetre broad. They are the resistant forms of the parasite, termed oöcysts or cysts. Young cysts show the contents filling them; older ones have divided internally into four rounded or oval bodies called spores, each of which in turn forms two curved primary infecting germs or sporozoites (fig. 1, A—D). When a bird has swallowed some oöcysts

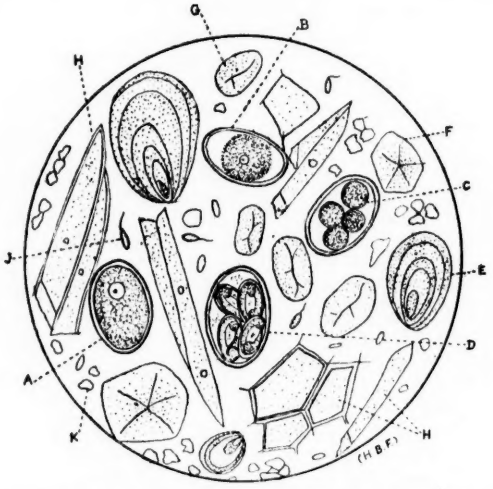

FIG. 1.—Portion of fæces of a fowl chick infected with coccidiosis, as seen when examined under the microscope. Magnified 500 times.
A—Oöcyst (cyst) of *Eimeria* (*Coccidium*) *avium* with contents filling it.
B—Oöcyst with contents forming a sphere.
C—Oöcyst with contents forming four small spheres, each of which is a young spore.
D—Oöcyst with four spores within it. Each spore contains two curved primary infecting germs or sporozoites.
E—K—Various kinds of only slightly digested food.
E—Potato starch grains, somewhat like oyster shells.
F—Maize starch.
G—Rice starch.
H—Cells from husk of grain.
J—Outlines of living, harmless bacteria from the fowl's gut.
K—Very finely ground pieces of food.

with contaminated food or drink, the oöcysts remain unchanged until they reach the duodenum of the host. Here, under the influence of the powerful digestive juices of the host, the cyst and spore walls become softened and the sporozoites escape. They rapidly pass to the wall of the gut (fig. 2, spz.), where each attaches itself to an epithelial cell of the lining and proceeds to bore its way inwards. Once inside, the parasite becomes rounded and

grows rapidly, feeding at the expense of the cell it has invaded. This growing, feeding phase is known as the trophozoite (fig. 2, par.).

After the trophozoite has attained its maximum size, it commences to divide. It is now termed the schizont (fig. 2, sch.), and, by the division of the schizont, a cluster of daughter forms or merozoites is produced (fig. 2, mz.). These are arranged in a group like the segments of an orange. Each bears a general resemblance to a sporozoite (fig. 2, spz.), though differing in details. One schizont

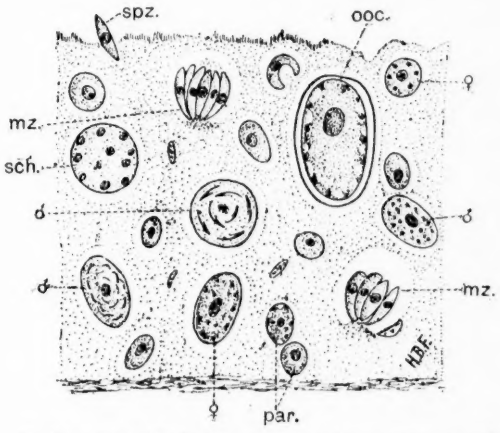

FIG. 2.—Portion of the blind gut or cæcum of a young grouse infected with *Eimeria* (*Coccidium*) *avium*, showing the lining epithelium riddled with parasites. Many stages in the life-cycle of the Coccidium are shown in section therein. Magnified about 750 times.

par—parasite—growing, feeding form (trophozoite).
spz—sporozoite, or primary infecting germ.
sch—schizont, or dividing form, for increasing the number of parasites in the bird.
mz—merozoites, or daughter forms.
♂—microgametes, or male elements of various ages attached to the male parent cell.
♀—female parasite, or macrogamete.
ooc—young oöcyst, or cyst.

usually produces from eight to fourteen merozoites, but as many as twenty have been found. A large increase in the numbers of the parasite is thus brought about. The merozoites soon separate from one another and each proceeds to pierce another cell, round itself, and grow again, till in time it becomes a schizont, and itself produces more merozoites. The result of this multiplication (or schizogony) of the parasite is the reduction of the gut lining to an almost structureless mass, and consequently serious digestive derangements, accompanied by acute inflammation of the intestine (enteritis), occur.

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In most cases some of the merozoites pass down the lumen of the gut and enter the cæca, where they pierce the cells and multiply just as in the duodenum.

After several generations of merozoites have been produced a limit is reached, both to the multiplicative power of the parasite and also to the capacity of the host to provide the invader with nourishment. Consequent on this, the Eimeria commences to prepare for life outside the body of the host and to produce sexual parasites, by whose union the resistant forms (oöcysts) are produced. The male and female Eimeria are ultimately very unlike each other, and the processes leading to their formation are termed gametogony.

Both the male and female progenitors are really trophozoites that become modified. The female form becomes a large, oval body, crowded with granular food material. Each individual is a female-mother-cell (fig. 2, ♀) and is destined to become a single female or macrogamete. The second form is somewhat smaller, and is far less granular than the first. It is the male-mother-cell (fig. 2, ♂), but it gives rise to a large number of males or microgametes. When the female-mother-cell has grown almost to its full size it forms a hard coat (the cyst or cyst-wall) around itself. This cyst-wall is tough and resistant, but a thin spot or micropyle is left in it, and, by means of this, the male can enter at the time of fertilization.

The males are formed as a network over the surface of the male parent cell, and gradually separate from the bulky remains of the parent cell. They are extremely small, being about $\frac{1}{2500}$ mm. long. Each possesses two extremely fine lashing flagella, by which it swims about in search of the female.

Fertilization has been watched in life. When the female has reached its final size, it often comes to lie close to the cavity of the gut, with its micropyle directed outwards. The microgametes or males break free from their parent cell, swim away vigorously and swarm round the micropyle of the female. One at length succeeds in entering, the micropyle at once is blocked up and thickened, and the excluded males speedily die. Very complete fusion of the two gametes (or sexual individuals) occurs, and the result is the formation of the oöcyst (fig. 2, oöc.). Fertilization may also occur in the lumen of the gut.

The oöcysts at first have their contents completely filling them. As they get older the contents become concentrated into a spherical

ball, which then divides into four oval masses. The latter form coats for themselves and become spores, within each of which two sporozoites or infecting germs ultimately develop (fig. 1, A—D). Thus the life cycle is completed ; its period is from eight to ten days.

Significance of the Different Stages of the Parasite.

It is of great importance to note that the period of the schizogony, or multiplication, of the parasite is the most critical time for the infected bird, since during this period there is great derangement of the digestive processes and acute inflammation of the intestine. The very taking of food merely irritates the already partially destroyed mucous membrane, yet the bird eats ravenously.

Coccidiosis set up in the duodenal wall is probably sufficient to kill very young birds, while older birds that may have partially recovered from duodenal coccidiosis, succumb to coccidiosis in the cæcum (typhlitic coccidiosis).

The onset of sporogony of *E. avium* usually means either the recovery or the death of the infected chick. When the infection has not been very acute, the oöcysts pass from the body, and the internal gut-lining may be able to regenerate, when the bird improves and begins to gain in weight. Sometimes infiltration of connective tissue into the lesions formed by the parasite aids in this recovery. When the attack is acute, too much epithelium is destroyed by the merozoites and by the outward passage of the oöcysts, and, as a result of the complications arising therefrom, the bird dies.

Modes of Spread of Coccidiosis.

Coccidiosis is a disease that spreads with great rapidity, and there is no doubt that the fæces of infected birds are the chief source of contamination. The direct contamination of grass on an open poultry run or in the more confined space of a pen or yard is easily brought about. The removal of excrement is essential, not only where disease is suspected, but in all circumstances. Should droppings of infected birds remain on the soil, even though the stock is removed, recurrences of epizoötics are probable. The droppings containing oöcysts crumble into a fine dust that contaminates the immediate neighbourhood, and is also distributed over larger tracts of land by the wind, thus increasing the area of infection. Infected dust deposited on the food plants of birds such as pheasants, grouse,

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or partridges, is easily taken by the birds, and outbreaks of disease occur among them. Infected fæces have been kept as a mass for four years, and have then been found still capable of producing infection.

Water also is an agent of spread of coccidiosis. Infected fæces are washed down by heavy rain into pools or other drinking places, where they remain ; or even if they are only washed into the earth, the soil is contaminated, and may serve as the grit necessary for healthy birds under normal circumstances. Oöcysts of *E. avium* have been collected from small tarns and pools habitually used as drinking-places by chicks, while the dew from heather has been found to contain oöcysts after outbreaks of coccidiosis in the neighbourhood. Again, these infective cysts are very resistant to water, and it has been shown experimentally that even forty days' exposure to water does not kill the encysted parasite. When it is remembered that young birds are far more susceptible to coccidiosis than older ones, the provision of uncontaminated food and drink becomes of the utmost importance.

It has previously been mentioned that certain adult birds become chronics. They are then veritable reservoirs of infection, and a source of danger to young and old birds alike, at all seasons of the year. It may be stated that as fowls, turkeys, pigeons, grouse, pheasants and partridges are all attacked by *E. avium*, there is always danger from fowls used as foster-mothers, and outbreaks among chicks of each kind of bird have been traced to the agency of chronic infected foster-mothers. In one case fifty fowl chicks died of undoubted coccidiosis within a few days. It was found that they had been reared with others by hens obtained from an estate where there had been heavy mortality the previous year. The foster-mothers were isolated, their fæces examined daily, and, in a very short time, two hens were discovered whose fæces showed daily crops of oöcysts. These birds had evidently become chronics and their excrement had contaminated the large grass run. Washings of the herbage in the run also yielded oöcysts when examined microscopically. This outbreak ceased without further loss after treatment, destruction of the infected foster-mothers, and removal to a new clean run at some distance from the old one.

Mutual infection of various birds can occur. Fowls reared on ground where turkeys suffering from "blackhead" have been raised and, conversely, turkeys raised on runs where "white diarrhœa" in

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fowls has occurred, become infected with coccidiosis. Pigeons feeding in infected fowl yards themselves become infected, and whole cotes have been exterminated by coccidiosis thus acquired.

Birds such as sparrows will obtain grain wherever they can. When they feed in infected places they can take up oöcysts of *E. avium* with contaminated food. Frequently the parasites pass through the bodies of small birds, such as sparrows, unchanged, but they are voided with the fæces elsewhere and so may serve as new centres of infection.

Other distributing agents for coccidian oöcysts in nature are the flies that feed on excrement. The cysts pass through their bodies unchanged, and are voided with their fæces, but the sojourn within the body of the insect in no way impairs their vitality, and they are quite capable of infecting young poultry or game if taken up by them.

Preventive Measures.

There is little doubt that "prevention is better than cure" in dealing with coccidiosis, and this is more particularly the case when dealing with poultry and with game-birds, such as pheasants, reared under semi-domesticated conditions. Sanitation in every detail must be insisted upon.

In the case of an outbreak it cannot be too strongly emphasized that all dead birds should be burned and not buried. Every buried bird is a new source of infection, and the polluted soil is distributed over wider areas by earthworms, carnivorous beetles, flies, moles, &c. Burning is the most successful method of dealing with coccidian oöcysts which are able to mature within the dead bird.

All droppings of birds in captivity should be removed regularly and thoroughly. These, too, should be burnt and not buried when disease is known to exist.

In the case of birds either partially or entirely under domesticated conditions, fouling of food and drink should be prevented as far as possible; this can be achieved to a considerable extent by providing movable feeding boards; food and drink should be placed on these boards, which can be removed and thoroughly cleansed. The pens should be so constructed that daily easy cleaning is possible; frequent lime washing of coops, perches, &c., is very useful.

Wherever possible, healthy birds should be taken off the infected

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areas, and their coops, &c., placed in new positions as remote from the old ones as possible. The fouled soil should then be treated with fresh quicklime, which, after an interval of about a week, should be well dug into the soil, the latter being turned to a depth of at least 1½ ft. No birds should be raised on this land for at least a year. Where the infected run is relatively small, the top soil can be removed to a depth of 3 or 4 in. and then turned; but even if this is done, it is advisable to lime the soil. If the birds are very heavily affected it is useless to remove them to fresh soil. It is much better to destroy them, and place healthy birds on fresh, unpolluted soil.

As sparrows, finches, and other small birds are known to spread coccidiosis, they should be excluded from runs or yards where disease is known to exist. Old netting can be utilized for this purpose. Pigeons should also be excluded from fowls' feeding places as far as possible.

Wherever possible, eggs should be disinfected before they are set for hatching. Strong methylated spirit can be used for rapidly wiping the eggs, and will be found efficacious. The eggs should be carefully and quickly dried after this treatment.

Fowls and turkeys should never be reared on grounds where much mortality from "white diarrhœa" or "blackhead" has been known to occur. If the original occupants of the land were turkeys, the oöcysts of *E. avium* producing "blackhead" would foul the soil, and, when taken up with food or drink by fowls, would produce the "white diarrhœa" or coccidiosis of fowls, especially if the birds were young.

When broody hens are to be used they should be isolated and kept under observation for a few days before use. Any with unusually fluid fæces should be rejected.

To sum up, sanitation applied in its most exact form in all directions is not only the best preventive of disease, but results in healthy stock maintaining their vitality and increasing their vigour.

Diet and Treatment.

With regard to treatment, any condition that tends to raise the resistant powers of the chick is of service and should be used. So far as feeding is concerned, local conditions often determine the particular procedure followed. The use of moist food as contrasted with dry feeding prevails in some districts, but, so far as ascertained,

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there does not appear to be much evidence in favour of one method over the other so far as the treatment of coccidiosis in adult birds is concerned.

Tonics are of some service as tending to raise the general vitality. Ten grains of sulphate of iron (green vitrol) added to one gallon of drinking water is useful, and the same quantity of salicylate of soda or salicylic acid has also been of service in some cases.

Where whey or buttermilk is available, it can be utilized with advantage for poultry suffering from coccidiosis. Sour milk in small amounts is also useful. As the lining of the alimentary canal is badly injured in coccidiosis, very finely crushed dry food or well-softened (scalded) moist food is recommended for chicks. If moist feeding is adopted, the food can be made up with whey or buttermilk with advantage.

For some years past the writer has experimented in the treatment of avian coccidiosis by means of catechu. Ten to fifteen grains of crude catechu are dissolved in one gallon of water. The dark sherry or ale-coloured solution so obtained is given to the birds as drinking water. The solution often darkens in air, but its usefulness is not impaired thereby. The birds drink it greedily and rapid improvement generally follows. The treatment is usually only necessary for about ten days. Fowls, ducks, pigeons, hand-reared pheasants, partridges and grouse in captivity have all recovered under this treatment. Although the objection might be raised that catechu is merely an astringent, the success of the treatment where properly tried has justified its general use.

Many other treatments have been devised and tested by the writer during the last few years, but where efficacious they were either too expensive or too difficult of administration for general application. No attempt to find anti-serum treatment for avian coccidiosis has yet been successful.

In conclusion, it may be mentioned that rabbits sometimes suffer from coccidiosis. If the symptoms are at all obvious (and they often are not) much benefit accrues from taking precautionary measures and instituting treatment on the same lines as have been recommended for avian coccidiosis.

The above investigation was aided from funds placed at the disposal of the Board by the Development Commissioners.—Reproduced by permission from the *Journal of the Board of Agriculture.*

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EPHEMERAL FEVER OR THREE-DAYS' SICKNESS IN CATTLE.

By W. KENNEDY, M.R.C.V.S.

British East African Protectorate.

Several outbreaks of this disease have recently been reported on farms in the neighbourhood of Nairobi, and as the literature on the subject is scattered throughout various journals, the following short *résumé* of what is known of the disease may be of interest and value to stockowners in this country. The principal writers on the subject are Veterinary Surgeons Bevan and Freer, of Rhodesia and Cape Colony respectively, and we are indebted to the writings of these gentlemen for most of the following information.

The disease first came under notice in North-west Rhodesia in November, 1906, and four months later it had spread to the Transvaal and Natal. It appears that "three-days' sickness" has been existent for years in Central Africa, and Freer is of opinion that it is only on account of the country being opened up to traffic that the disease has commenced to spread in new areas.

The Bahema in Ankole (Uganda) described a cattle disease in 1911 under the name of "kabohi," the symptoms of which, as described by them, appeared to be identical with those of "three-days' sickness." The Masai also describe a similar disease.

The scientific term "ephemeral fever," as well as the lay term, "three-days' sickness," are both somewhat appropriate, as in the great majority of cases the disease quickly runs its course, and all acute symptoms have disappeared at the end of three days.

Cause and Mode of Infection.

Ephemeral fever is due to the entrance into the system of a specific organism, and can be transmitted to a healthy animal by inoculating blood drawn from a sick animal. Cattle of all breeds, and in all conditions, are susceptible to this disease. Young calves seem to possess a greater resistance to natural infection than older stock, and fat, stall-fed cattle usually show more acute symptoms than those in low condition. The period of incubation after inoculation with virulent blood is two to three days, and one attack of the disease confers an immunity which lasts for six

weeks. The blood of a recovered animal is not infective. It has been suggested that the disease is insect-transmitted. So far, transmission experiments with ticks have failed.

Symptoms.

The earliest indications of an attack are loss of appetite, suspension of rumination, a rise of temperature, with roughness of the coat, a watery discharge from the eyes and nose, and, in the case of milch cows, suspension of lactation. These symptoms develop rapidly, and in a few hours the temperature may reach 106° F. Painful lameness appears in one or more limbs, and the lameness may rapidly pass from one limb to another, or there may be general stiffness of the whole body. The stiffness of the neck, with more or less inability to swallow, is very characteristic. The mucous membrane of the mouth becomes reddened, the eyelids swollen and the eyes glaring in appearance. In the majority of cases the bowels are constipated, the fæces being covered with strings of mucus. In cases where the animal lies down there is inability to rise, and when placed on its feet there is evidence of loss of power, and the animals quickly resumes its recumbent position. In about forty-eight hours the temperature falls nearly to normal, appetite returns, acute symptoms disappear, and in the greater percentage of cases the animal is convalescent at the end of three days. The only constant *post-mortem* lesion of importance is enlargement of the lymphatic glands, particularly those in front of the sternum or breast bone.

Mortality.

The mortality from the disease itself is almost *nil*. When animals are suffering from stiffness of the neck, and owners persist in drenching them, there is a grave risk of death resulting from pneumonia owing to the animals being unable to swallow properly and the drenches going down the windpipe instead of the gullet.

Immunity.

Freer states that although in a large percentage of cases one attack confers an immunity for a considerable time, still, numerous cases have come under his notice where cattle have had two and three attacks. In the majority of cases the second attack is worse than the first.

TREATMENT.

The less the patient is interfered with the better will be the results. The sick animal should be put in a cool, shady place and made comfortable. If the bowels are over constipated a dose of Epsom salts would be beneficial, but great care should be exercised in administering it, especially when the neck muscles are affected. Transport oxen should not be inspanned for at least a fortnight after recovery as they are quite unfit for work before that time.—*Agricultural Journal of British East Africa.*

HINTS ON TRANSPORT WORK.

By CHARLES C. ABRAM, M.R.C.V.S.
Walsingham.

HAVING had considerable experience in the travelling of horses at sea in various parts of the world, I am writing a few rough notes in the hope that they may prove of some service to the younger and more recently qualified men to whose lot it may fall to take veterinary charge of cargoes of remounts during the present hostilities.

In purchasing large quantities of animals in more or less limited time, in order to find a cargo for a boat the detention of which may cost a very large sum per day, in demurrage, and in order to keep up the fresh supplies of remounts necessitated by the incessant wastage of warfare, the novice will naturally find it impossible to put the time and *minutiæ* into each individual animal which would be possible were he examining only a few racehorses, say, worth several hundred pounds apiece; yet with the method to be described it will be found that with ordinary care no radically unsuitable or unsound animal need be found among his selection.

After a preliminary examination of the horses in the stables, it is the writer's custom to have a number trotted round in a circle, he standing meanwhile in the centre, as is done by the judge at a horse show. It is then comparatively easy to divide the unconscious candidates for campaigning hardships into two classes: (*a*) *The obviously unfit*—either from size, action, conformation, or vice (and I may add in parentheses that it is unfair to expect the average trooper to ride an animal that a rough-rider would shake his head at); and these being discarded, a second contingent is left for after

consideration; (*b*) thus leaving a residuum of those animals which are, more or less, of the desired type.

These latter are then examined for soundness, and if sound, and if they meet with the approval of the purchasing officer, they are branded on the hoof, as an outward and visible sign of their being destined to be (bar accidents) the mounts of those whom His Majesty the Kaiser is humane enough to describe as "cannon-fodder"!

It will then be time for another look at those left for further consideration, when the same procedure will be followed, and so on until the number of horses submitted to inspection is exhausted. And "right here" (as the Americans say), while I think of it, let me warn the novice against "passing" a horse which has been discarded on a previous occasion. Many unscrupulous vendors will bring up a horse which has "failed to pass," more or less disguised (by "pulling," trimming, clipping, &c.), two or three times at intervals, in the hope of catching the examiner unawares; and few things are calculated to make the novice look more foolish than to accept one day an animal which he has rejected on another.

Having thus cursorily glanced at the duties and methods of the examining veterinarian, let us turn to the still heavier responsibilities of the man in veterinary charge of a horse-boat. Once detailed for that duty, a wise precaution is to make as thorough an examination as may be of the scene of one's future labours, with a view to having any little alterations made, in structure or arrangements, which may be deemed advisable. This may generally be accomplished with a little tact, especially if the chief officer prove as obliging an individual as the great majority with whom the writer has come in contact have turned out to be; and it should be remembered that little things which count for inconvenience, or worse, at sea can often be rectified in port at a trifling expenditure of either time or money, though if overlooked or neglected they might make considerable difference to the success of the voyage.

A careful examination of the temporary surgery, which has probably been rigged up somewhere "aft," will most likely reveal a woeful deficiency in one's favourite specifics, and make one heartily wish that Messrs.—(but no! I must refrain from giving them a gratuitous advertisement)—were within telephonic reach, but as they are not, some more or less efficient substitutes can possibly be procured ashore, and this should by no means be overlooked, since

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few things are more worrying than to have a bad case at sea—to know that it is going from bad to worse, and to be all the time reflecting—"If *only* I had so-and-so!"

Now comes a still more important matter. One may, with more or less complacency, "throw physic to the dogs," according to individual idiosyncrasy, but no one will deny the all-importance of *diet*.

It would be beyond the scope of this article to enter into a dissertation as to the various food values of the different foodstuffs, as the providing of the fodder will not fall within the travelling veterinary surgeon's province. But it will naturally be his first consideration to ensure that the fodder which may be on board shall be dry, sweet, and clean, and of good substance and colour, before sailing; as it is obviously futile to hurl imprecations at a defaulting contractor's head when one and one's charges are in mid-ocean, thousands of miles, it may be, from the nearest corndealer's.

In this connection it may be noteworthy that hay may become damp before or while being shipped, and is thus liable to be mouldy, in which case one may reasonably expect digestive troubles. Here, once again, a little forethought and trouble in port may save many an anxious hour at sea.

It is the general experience of shippers, I think, that horses do better the first day or two on a light diet—say bran—bran and boiled linseed mash, with a little long hay; and it is a common practice, which may or may not be advisable, to introduce a small dose of mag. sulph. into the mash or drinking-water, and then, as the horses get their "sea-legs," to get them on to their corn gradually, the amount given daily naturally varying with the size of the animal, &c., the well-worn platitude being borne in mind that, when more food is introduced into the stomach than can be readily digested, the action of the gastric fluids is retarded, and that chemical changes ensue which may lead to fermentation, and have flatulent colic as a possible result.

On the other hand, insufficiency of food (which may readily happen from the carelessness of the casual ship-horsekeeper, resulting in one horse having too much and his neighbour too little) will, of course, tend to promote debility, and a corresponding predisposition to contract any epidemics (*e.g.*, strangles) which may be latent, and which are obviously difficult to deal with at sea, if only on account of the practical impossibility of strict isolation.

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It is not the writer's intention in this brief article to enter into the subject of the relative weights or proportions of albuminoids, carbohydrates, fats, &c., or into any other dietetic details, which the inquirer can obtain to better purpose from any text-book on the subject. Let it suffice for him to suggest to the novice the advisability of systematic (but irregular as to *route*) patrolling of decks during feeding and watering times, and the necessity of keeping a careful eye upon the *condition* of his charges.

Wonders can be worked sometimes by giving those unfortunates which are stabled next to the boilers, or in the lower hold, a change to a cooler spot, while it is very advisable to have a "bone-yard," or convalescent home, well forward in the "fo'c'sle," or near a port-hole, where the invalids may enjoy plenty of daylight and the revivifying breezes straight from the ocean, without, of course, incurring undue risk of draughts or of wetting from spray. And in this connection, the help of coco-nut matting in giving a nervous or awkward horse a good foothold in the alley-ways, while changing from stall to stall, should not be forgotten.

A word in conclusion as to the staff. The practitioner may possibly (though in this campaign improbably) have an Army farrier or two on board to assist. If that be so, and his experience be like that of the writer, he will find them "a very present help in time of trouble." If not, he must do his best with the material to hand, which may vary from the reliable, conscientious hard worker to the shirking scoundrel, who cuts tails for the sake of the hair, does as little work as possible, and who has a tendency to smoke anywhere he can find to hide in (including the fodder holds), with a sublime indifference to the safety of the ship, even though his own worthless carcase be part of the cargo.

A punishment for this offence, which the writer found efficacious, was to handcuff the offender to the ship's rails for a few hours—full in the tropical sun—a disciplinary measure which possibly gave him a foretaste of the temperature of his eternal destination, but in this connection the novice for whom I am writing should remember that, in the end, all power to inflict punishment—all authority begins and ends in the captain of the ship, who is the autocrat of autocrats, when once in "blue water."

Finally, the writer may perhaps be allowed to allude to the necessity for the strictest cleanliness possible, in the stalls and elsewhere, to the advisability of clipping long-coated horses in warm

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climates, and to express the hope that the mistake made in the South African War will not be repeated in this campaign, viz., that of subjecting horses to prolonged and severe exertion when fresh from a long sea voyage, after having been for some time deprived of all exercise. The military necessity in South Africa for the immediate working of freshly, or comparatively freshly landed animals, was probably the cause of an immense waste of horse-flesh, not to mention the vast amount of animal suffering involved. But such considerations are alike beyond the scope of this article, and the needs of the potential tyro for whom it is written, besides being a superfluous encroachment upon valuable space.

THE MULE IN THE ARMY.

It would appear from the quality of the latest arrivals of mules here that they are to be used for cavalry purposes. The lot at Epsom are declared by experts to be as clean as polo ponies, able to gallop, and quite big enough for the purpose—they are about 14 hands 2 in. high. They would outrun any of the heavy stamp of horse, of which there are plenty left, whilst horses suitable for cavalry purposes are scarce all over the world. Mules, of course, are used by Spanish and Mexican cavalry, but they have not hitherto been used in the British Army except for transport and for mountain batteries. The likelihood is that there will be a revival of the mounted infantry idea, to take light cavalrymen who are now working in the trenches from place to place where motor traffic is impossible. Sir Garnet Wolseley in 1872 foretold something of the kind in his "Wellington Essay," where he said that mounted infantry on mules or even in carts, accompanied by a small proportion of real cavalry, would be of signal use in days to come. The mules and ponies that formed the whole of Sir Frederick Roberts's transport from Kabul to Kandahar—he had no oxen or camels—carried two "maunds," which is about 160 lb., but were capable of carrying much more. A mountain battery mule's load runs up to 220 lb., but he is never as big as even 14 hands.

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Clinical Articles.

DEATH AFTER APPARENT RECOVERY FROM STRANGLES IN HORSES.

By J. F. D. TUTT, M.R.C.V.S.

Winchester.

The subjects have been in every case horses of five years of age and over. After the external lesions have healed, and the patient seems to be on the road to early return to work, a loss of condition, which is usually very rapid, is observed. No medicinal

remedies appear to be any good. The same remarks apply to vaccines. The appetite usually remains quite good. Death has been in nearly every case sudden. When death has been observed, the animal has fallen dead as if shot; in some cases the animal has even been eating at the time of death.

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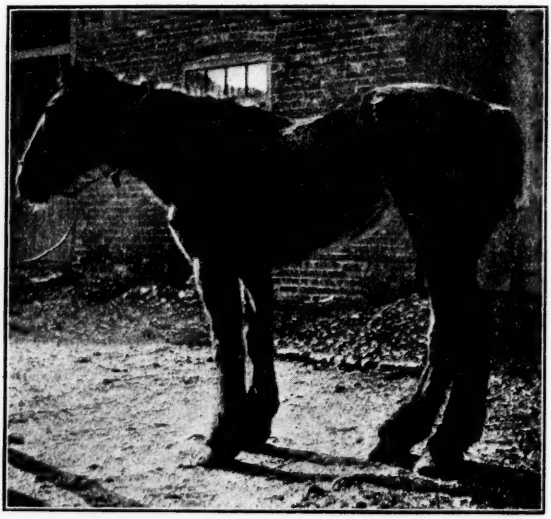
POST-MORTEM.

The constant lesions have been: extensive strangles, abscesses in the lung tissue and in the bronchial lymphatic glands. In one



case there were abscesses along the cervical portion of the trachea in addition to the usual lung lesions.

The accompanying photographs show very well the emaciation that usually heralds a fatal termination.

OBSERVATIONS OF A PRACTITIONER.

By J. W. POLLOCK, M.R.C.V.S.

(1) MYELO-MENINGITIS IN A TWO-YEAR-OLD COLT.

THIS case occurred on a hill-farm, which is badly infected with "louping-ill," or "trembling," amongst the sheep. James Law, in Vol. IV of his "Veterinary Medicine," states that "the succession of symptoms in 'louping-ill,' or 'trembling,' in sheep are in the main such as are observed in other cases of myelo-meningitis." As there was no other origin of the disease to be discovered in the case, I came to the conclusion that the cause must be the same as that of "louping-ill," which is very prevalent on the farm.

W. Williams claims to have heard of cases of "louping-ill" in horses (J. Law, Vol. IV). The disease is not uncommon in young cattle on the hill-farms only of this district in Dumfriesshire. The symptoms observed in the case of the colt were very pronounced. When first seen he stood propped on his legs, and when moved he did so stiffly and uncertainly—just as in what is commonly called "staggers." The colt had been on a bare hill pasture and was getting no corn or other food. In a day or two hyperæsthesia and oposthotonos were well marked and there was some hyperthermia; the back became quite hollow, and the colt "trembled" when approached. When walking the feet were lifted up rather sharply and brought to the ground again uncertainly, whilst the hind quarters swayed from side to side. A few days later paralysis followed and was complete in the limbs. As recovery was now not to be looked for the colt was destroyed, but, unfortunately, I had not an opportunity of making a *post-mortem* examination. The treatment was chiefly eliminative, the purgative at the commencement having a good effect in emptying the bowels. I have described the special symptoms of this case to draw attention to the fact that "louping-ill" may occur in young horses as well as in ruminants.

(2) Tobacco as an Internal Medicinal Agent.

Some time ago I read in one of our periodicals that a decoction of tobacco was used in Ireland with good results in the treatment of chronic diarrhœa in young cattle. As I have had very little success with other drugs used for this disease, I decided to try it. I procured it in powder form (not snuff) from the British Drug Houses, Limited, and prescribed it in powders along with chalk, tannic acid, catechu, gentian, and a condiment. Since using tobacco in this form I have had some good recoveries in cases of chronic diarrhœa in yearling and two-year-old cattle especially.

A considerable number of young Irish cattle are imported into this district annually, and some of these have this disease. It seems to me that this diarrhœa must be parasitic when the tobacco has often such a good effect on it. I have not had an opportunity of ascertaining if any of my cases were those of Johne's disease, but it is scarcely probable that the "drug" would have any effect on that complaint. Formerly I used antiseptics with astringents and sedatives, but a sedative is scarcely necessary when tobacco is used. The tannic acid renders nicotine insoluble, so that there is not much

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risk of poisoning when they are dispensed together. I use ʒi doses for stirks and ʒii doses for two-year-olds, three times each day.

(3) DYSTOKIA.

My attendance was requested to a cow, from which the placental membranes were hanging, but she had not calved. She should have calved in June last, so that she had carried her calf about *five months* past her due time. On examination I found that the presentation was normal, but the head was enlarged and deformed and the whole body of the calf was emphysematous. Cords were attached to the fore legs, but these broke away at the knees, so decayed was the fœtus. With considerable difficulty a loop of rope was got over the enlarged head and by this means the calf was pulled away, though considerable force had to be used. The labour pains were very weak, and, when the cow was not interfered with, these were altogether absent.

The case is interesting from the length of time the cow carried the calf. The owner thought that she was not pregnant and was feeding her, and she was already in good condition, even with the decomposing calf in her uterus.

THE USE OF IODINE IN THE TREATMENT OF FOOT CASES.

BY G. F. STEEVENSON, M.R.C.V.S.
Lieutenant, A.V.C.

DURING the past four months a large number of foot cases (picked up nails, punctured feet and pus in the foot) from various causes have occurred amongst the horses in the Brigade of Royal Field Artillery in my veterinary charge. All these cases have been treated with iodine (B. P. tincture), and the following is a short account of the treatment, the results obtained, and the principal causes of the injuries.

Causes.—(1) In the great majority of cases the injuries have been punctured feet due to picked up nails, owing to the horses working in places where houses have been demolished by shell fire or other causes, the nails found being in nearly all cases either ordinary wire nails or those used in the roofs of houses. In some cases the foreign body has been detected actually embedded in the substance of the frog or between the frog and the sole, in others nothing has been noticed until the horse has been brought in lame and the foot

examined, and perhaps a large part of the sole found underrun with pus.

(2) A few cases have been due to horses casting a shoe, and through this either being unnoticed at the time by the driver or being some distance from a farrier, the foot being worn excessively low and pus forming in consequence. Injuries from this cause have most frequently occurred in heavy draught horses.

(3) A minority of cases have been due to horses treading upon a cast shoe with the nails remaining in it and pointing upwards.

(4) Laceration of the frog by pieces of glass has occurred in one or two cases.

(5) Pricks in shoeing account for four or five cases.

Treatment.—The following treatment has been adopted in all cases as a routine method:—

(1) Remove the foreign body if one is present.

(2) Give exit to the pus and free drainage ; remove all underrun horn.

(3) Cleanse the part with a piece of clean *dry* cotton wool.

(4) Apply tincture iodine *without* any previous washing.

(5) Cover the part with a lump of clean tow soaked in an antiseptic oily dressing, and after replacing the shoe keep the tow in place by means of two bars of hoop iron placed X wise across the foot and themselves maintained in position by the shoe.

A good recipe for the antiseptic oily dressing is as follows : camphor ʒss, creasote ʒi, ol. tereb. ʒii, ol. arachis Oi, or when this has not been available a 1 per cent. mixture of lysol in the oil used for the guns (Rangoon oil) has been equally successful.

The object of applying the tincture of iodine without any previous washing is that it then penetrates better into the depths and remoter parts of the wound, especially if this be a puncture. If the part be previously washed the insterstices of the wound are then filled by the solution used and so the thorough penetration of the iodine is actually prevented. It seems better to remove the whole of the underrun horn, even in cases where this may entail removal of the greater part of the sole, than to trust to the exit of the pus and the penetration of the iodine through a smaller opening, as even when this occurs bits of grit get into the cavity previously occupied by the pus, between the horny and sensitive soles, and may cause the horse to go lame again. Many of the horses treated by this method have had to stand in deep mud, but in no case have there been any untoward effects

ascribable to this. In many cases the horse trots sound on the third day (in slight cases and those found early, sooner than this) and may be put to work, still keeping the bars of hoop iron in position for protection, on the fourth or fifth day.

The following is a summary of the cases treated during the period October 1, 1914, and January 31, 1915 :—

Cases treated, 62 ; returned to duty, 55 ; transferred sick, 4 ; destroyed, 3.

The average duration of treatment for the "cured" cases was 8·04 days, and if five of the worst cases be excluded only 6·4 days. Of the three cases destroyed, necrosis of the os pedis occurred in two, and penetration of the navicular sheath by the nail in the third. Of the four "transferred sick" two were cases of quittor and two were cases in which practically the whole of the sole had to be removed.

CHRONIC LAMENESS AFTER PICKED UP NAILS.

By Professor SCHWENDIMANN.

Bern.

After severe injuries from treading on nails, especially when followed by considerable tissue defects, one at times observes, after complete healing and horning over of the wound, lameness persisting for weeks and months or even during life.

This unfortunate result occurs in injuries of the navicular apparatus, of the flexor tendon, of the bursa, and of the coffin bone, but it may be produced also when only the cushion of the frog or the ligaments of the coffin joint are involved. The anatomical causes of the symptom are not always cicatrix contraction and cicatrix pain respectively, yet in most cases it is so. Each condition suffices to bring about this chronic inability, but as a rule it is the product of both factors. Chronic inflammatory processes seldom occur at the navicular bone ; cartilaginous degeneration, osteophytic deposits, or more frequently chronic inflammation of the cushion of the frog is suspected if the lameness proves wholly incurable.

The fibro-angioplastic tissue of the granulation is at first very voluminous and its disposal irregular, in keeping with the destroyed tissue tension. Later on it becomes organized, the intermediate substance diminishes, the tissue shrinks and assumes a firm and thick

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consistency, later on always becoming harder. Whilst the blood-vessels waste away and disappear through this retraction, this process exercises a painful pressure on the nervous elements of the germ tissue and its neighbourhood (cicatrix neuralgia) which continues at least until investment and accommodation of the part occurs.

Pressure and strain of the body weight in movement are the forces which serve for this appropriate scar tissue investment. The nervous portion of this tissue undergoes a painful dragging which continues until the fibrillæ and nerve bundles have arranged themselves parallel to the pressure and strain.

Finally, the destruction of the elastic tissue which occurs profusely in the injured region plays a significant *rôle*. The elastic elements only regenerate themselves sparsely in the scar and later on not at all. This has the result that the firm, thick, and unyielding scar causes painful pressure and dragging on the place when the strain of movement and weight of the body acts on it. Diagnosis is easy as soon as we are in a position to bring a reliable anamnesis to the examination, or where the history of the case is known from our own observation. The inability is indicated by a pronounced supporting leg lameness, which is quite marked at the beginning of movement. Severe exertion, however, causes it to become worse. The phalanges are held in volar flexion. Setting foot and standing is accomplished preferably with the wall of the toe. Atrophy of the upper arm or thigh region is regularly present and also more or less diminution in size of the foot. Marked arterial pulsation as well as increased warmth are regularly present in chronic phlegmony of the plantar cushion, and a hard swelling may arise at the bulb of the heel and a deformity of the foot similar to that seen in laminitis.

Prognosis must be cautious in any case and bad in chronic inflammation of the plantar cushion. A careful and suitable treatment of injuries is the principal prophylactic measure. Therapy consists in hot antiseptic foot-baths, poulticing, setoning, and surgical treatment.

Neurectomy may be performed as a final measure and often has good results. Where the horse goes on his toe for a long time a piece of iron, from 3 to 5 cm. long, may be put on to project over the shoe at the toe, and this often has a favourable effect on old lamenesses in a fortnight or three weeks, where work is also properly regulated.

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FATAL HÆMORRHAGE INTO THE STOMACH OF AN AMERICAN BISON.

By GUILL. F. MARAIS, B.A., B.Sc., M.R.C.V.S.
Government Veterinary Surgeon, Pretoria, Transvaal.

Subject.—An American bison, female, about 6 years old.

History.—The animal in question was imported for the Pretoria Zoological Gardens about two years ago. Like the other bisons in the Zoo it developed a cough every year about the same time (during the warm rainy season), from which it had, however, just recovered when it was taken suddenly ill. It gradually became weaker, showing great shivering fits, and died the same morning.

Post-mortem.—On handling the carcase a large amount of blood-stained liquid ran from the mouth and nostrils. As an accident was suspected the base of the skull and spine were thoroughly examined but proved normal.

The fat, flesh, and subcutaneous tissue were also normal.

The lungs showed old lesions of pleurisy, the right lung being attached to the costal pleura.

The liver was very pale in colour and soft in consistence, as also the kidneys.

On examining the interior of the reticulum several blood clots were found and a piece of wire about $2\frac{1}{2}$ in. long, piercing the muscular wall and extending into a fairly large blood-vessel, which showed signs of hæmorrhage.

The rumen also contained a large amount of clotted blood and blood-stained ingesta.

The endocardium of the left ventricle was extensively hyperæmic, especially towards the base, also a few hyperæmic patches were noticed in the right ventricle.

Cause of Death.—Hæmorrhage into the reticulum and rumen.

EXTRACTS FROM THE LETTER OF A VETERINARY OFFICER ON ACTIVE SERVICE.

SEPTEMBER 10.—I am quite fit and well, in spite of all the trials of war. We are continually on the move, sometimes by day and often by night; we have covered hundreds of miles since we came. It is a terrible thing, this war; I hope and trust I may never see war again after this is over.

It is frightfully hot here in the daytime; it is nice sleeping out at night when it is fine, but we all get covered with bites, which irritate frightfully, from sleeping in the open on corn-fields. France really is a lovely country, most productive; there is corn and fruit everywhere in abundance, and the old farm-houses are simply beautiful. We came along a valley a few days ago, the most lovely scenery I ever saw.

September 13.—We had rather an unpleasant thing yesterday. Captain E—— and I were going along the road where a battle had been fought, and a man came and told us there were four dead English soldiers in a wood, so we took a party and buried them. Captain E—— read the service, and we piled up the grave with stones and put a cross at the head of it. Every wounded soldier I see I feel I should like to hear of the Kaiser's having a bullet put into his body for all this awful misery he has caused. We see lots of German prisoners every day; most of them are very nice men, and any amount of them speak English. They are good-looking, educated young men, and the British Tommy does not bear them the slightest malice.

September 16.—The more I see of this awful war, the more I think the Kaiser wants hanging. By Jove! it would be good for some of those people in England who grumble at every penny they spend which is not for their own luxury to have an invading army through the country, to see whole towns, villages, and beautiful country houses all ransacked and looted by the Germans, as we see passing through here every day. When you thought I was not well I was all right in health, but my spirits were so depressed—it was awful that retreat from the Belgian frontier to thirty miles south of Paris; we were marching day and night, scarcely ever had my clothes off, and sixteen hours in the saddle most days. We often saw a dozen or twenty Uhlans detached from their main body, scouting and watching us from a distance; we never knew which day or night we might not be held up and cut up or captured. Although the army retreated, I believe it was one of the finest things the British Army has ever done, retreating in such splendid order against such enormous odds. I saw my Colonel of the A.V.C. one day, and he said from what he saw every soldier almost must individually have been a hero. I expect you will see by the papers that things are going much better now; in fact, we are advancing every day.

It does seem a pity to see all this beautiful corn standing in the fields and wasting; I suppose there is no one to gather it in. I think I told you before what a beautiful productive country this is.

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I think the Germans must be getting more than they bargained for. Now we capture small detachments of prisoners most days which have got separated from their main body, and they talk as though most of their pals were about having enough of it. I don't think they thought England would fight, and now they find she did, I think they find they have tumbled up against something a bit tougher than they expected. . . . The difficulty is getting one's letters posted after they are written, as all the post-offices in villages and towns are closed, and we can only post at a military post-office, which I do not very often come across.

September 18.—It has been very wet these last few days; we get tremendous rain here when it starts, much heavier than in England. It is horrible riding all day in the wet and sleeping out at night afterwards. Thank goodness, we got in an empty house last night and had quite a good night.

It is a dreadful business, this war. Where the Germans have invaded France the villages and towns are deserted, and all the lovely country houses ransacked and looted. English people at home have no idea what war means; to see the thousands of refugees—old men, women, and children—wandering about the country in large wagons is heart-breaking. Our soldiers are having an awfully hard time fighting every day, and yet, when you talk to the wounded, they are all anxious to get back to the Front. Our medical officer took a piece of shell as big as your fist out of a man's back yesterday, and all he said was, "How long shall I be before I can go to the Front again?" Those men are heroes; nothing seems to stop them till they are knocked out altogether.

September 20.—I was in Lagny the day they blew the bridges up over the Marne to check the German advance. By Jove! those were days to think about! I am a long way from there now, close to where the fighting is. In those early days of the war the refugees were the saddest sight I ever saw—they fairly blocked the roads up round Paris. It has been very wet lately; we are sleeping in our valises on the floor in farmhouses now whenever we can, but often under ricks and hedges, or wherever we can get out of the wet.

Thank you so much for the papers. We actually had the luck yesterday to get hold of two papers only three days old—it was a luxury. We have actually been in the same place now for three whole days; we have never stopped more than a few hours before. Will you send me some cigarettes?—but wrap them up somehow to disguise them, as if they are suspected of being cigarettes we shall never get them. I don't think they ever get past the base, as lots of men have never had cigarettes which were sent weeks ago.

If what I hear about the German soldiers is correct, I think the whole lot ought to be exterminated. I have heard awful stories—from good sources, too—which occurred at Château Thierry and Coulommiers. I went and had a look at the battle-

field round Clercy the other day; it was most interesting. We have had a very wet fortnight, but it is a beautiful day to-day. I am feeling as fit as possible. I am simply charmed with this country; it is the most lovely agricultural country in the world I should think.

September 25.—I got your postcard last night, dated September 13, also the dossier for the 8th and 9th. Thank you so much for sending them; we were all pleased to get hold of some news. It looks as if we shall winter here. I shall have plenty of clothes to get through it all right. I have not been inoculated yet, as it is almost impossible to be done on march, as it sometimes makes you feel ill for a day or two. I shall have lots to tell you all when I get home. The more I see of this country the better I like it; it must be a perfect place in peace time. We are having very nice weather again now, but very cold nights. . . It is funny to see the motor transport, hundreds of cars with the names of English firms one knows so well. I have seen several of Worthington's and the Derby Co-op.

September 27.—We are having an easier time just lately as we are not moving much, things being at a standstill at the Front. We heard the big guns incessantly day and night for the past twelve days.

As the Army moves on it is wonderful how quickly all the refugees come back to their homes; most of them get a rude shock, too, when they do return. It is surprising how clean most of the country people are, and the girls all look so clean and tidy. The living is pretty rough; we live on our rations, bully beef and bread, supplemented by whatever we can buy in the country in the way of milk, eggs, or fresh meat, but, as you may imagine, the Germans have not left much behind, and then there is the Army in front. When you go into a shop when passing through a small town and ask for something, they throw up their hands and say, "Les Allemands ont tout pris." I was talking yesterday to an officer of the Seaforth Highlanders who was wounded and going to the base. He said how happy and well-fed the men are in the fighting line. They get more food than when in barracks, so you can tell this to the soldiers' wives you are looking after—it will perhaps comfort them a bit.

The M.O. and I get on very well together, and have as good a time as possible under the circumstances. If we are not moving on we take rides into the country villages round. There are some beautiful churches in nearly every village. The French villages are most interesting.

September 28.—We have been here (Neuilly St. Front) now four days. The time seems to go very quickly as there is always something to do. I have about 400 horses to look after; the number varies, because sometimes a lot are sent up to the troops with food. The Crown Prince stayed in this village where we are now; the French bayoneted the Germans out. The caretaker of the house we are in had a German officer's helmet, which he gave me. I hope to bring it back as a souvenir. I gave him some tobacco for it.

September 30.—We have had a roughish time up to now, but things are settling down a bit, and we are getting into our stride again. You hear some funny tales out here from some of the men when they come out of the firing line, but, after all, some strange things do happen, and the Tommy at war is a great, good sport, and a hero on to that. I will tell you a thing which happened a day or two ago—the medical officer who saw it told me. He was proceeding with a supply column, and a shell dropped on two horses and wiped them clean out of existence, and, of course, they made sure the driver was killed. He was smothered in blood, but bar being petrified with fright he hadn't a scratch on him. I myself saw a funny thing. We were fetching some gun limbers in which had been abandoned by the Germans in their retreat, and on the seat of one where a man had sat was left a mass of pulp and blood and scraps of a German uniform, but the limber had only got a bit knocked off the back. Well, we had some stirring times in that retreat from the Belgian frontier to south of Paris. We were in hourly danger of being scuppered or taken prisoners; it was not pleasant, I can assure you. It gave you that sort of feeling I used to have when I was a youth and going in for a boxing bout or a very unpleasant Rugger match. You know the feeling, and when you get at your work it is all right. Well, we had the feeling all the time without having the work—not that I was anxious for the fight. I can imagine exactly how the Tommy feels. It is the suspension which hurts, and when he gets busy at his job he forgets all in the excitement of his work. The most exciting time was at Lagny. We were the last convoy to cross the Marne, and I was in the rear and five more. After we crossed up went the bridges. By Jove! what a noise! Talking about Tommies, they are funny. One day on our retreat we expected to be attacked every minute and formed the wagons into a square, with the men around lying all round the wagons. It was a very hot day, and I saw our mess cooks under a wagon both fast asleep and snoring like pigs. They had both been in South Africa and seen some fighting, but I thought it just about took the cake.

I am afraid we look like being here all winter. If the British mean going to Berlin there will be some fighting yet. I think one good thing about this war: all the British troops seem in excellent spirits up to now; you hear very little grousing from the men who come down from the Front. (Letter to Mr. Fergusson.)

October 2.—We are still hanging about the same place, some days just moving a few miles. We are sleeping indoors in our valises on the floor; it is quite comfortable. We are having very cold nights and beautiful hot days. I expect the troops at the Front are feeling these very cold nights, but I should think from all accounts they are as happy as possible under the circumstances. I expect our hardships will start again when the Germans retreat and we have to go over the country they have been fighting in.

I did not see Père Gigôt. I did not have time to go, as he lived two miles outside Dammarten. It was lucky I did not go to see him, as that was the day we had to scuttle out of our camp with the Uhlans at our heels. I see there are only about four Territorial A.V.C. officers out here, so I suppose we ought to consider our selection an honour.

I got that bundle of papers last night; they were most acceptable. We never see a paper unless it is a week old. Most of the places we read about we have seen, and also plenty of the photos in the illustrateds are quite familiar. I read an article in one or two of the papers about the refugees returning to their homes. It was true in every detail; we see such scenes nearly every day.

October 5.—We are moving off to-day, and then, I think, we are entraining, so you need not be surprised if you do not hear from me for some time, as we shall be out of touch with the post. I do not know where we are going, but it may be north of where we were when we started that retreat.

Isn't the list of killed awful! But I believe the Germans' is something terrific—all the prisoners seem to say so. Most of the stories of the horrors committed by the Germans are true, as I have seen any amount of it myself.

October 12.—I have had rather a strenuous time lately. We were just behind the Aisne, where we moved by several long marches, and then we entrained for several hours, and we hope, if things go right, to be soon further on into the country that has received such an awful time. It is quite strange to be in a country where there has been no fighting. I do not know anything about how the war is going elsewhere, but I hope they are advancing in the centre or the east. I got the two batches of papers. I do so enjoy reading the *Times*, and the *Mirrors* and *Sketches* are very popular with us. I am just going into A—— to take some sick horses.

October 17.—I am looking forward every day to getting some more letters from you all. We have been moving about a good deal lately, so have not been able to get letters. I am a long way from a military post-office, so don't know when this will be posted, but I hope you will get it soon. The part of the country we are in now has not been overrun by the Germans, so that there is nothing particularly exciting in trekking along. It is a very nice country, exactly like that from Calais to Paris. We have not heard much the last day or two how the war is going. I was sorry to see Antwerp has gone. We can only hear the guns from here indistinctly, so that we are probably twenty-five miles from the fighting. I expect we shall keep moving up. I shall never forget the din of artillery at the battle of the Aisne—it hardly ever ceased for about a month while we were there.

We have plenty of Rugby footballers here. The M.O. in the other park plays for the Army, and also played last year for Ireland. We also have a lieuteant who plays for the Harlequins. I shall have to ask them down next winter, and get them to play in a match or two for Burton.

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I have been very busy just lately—influenza has broken out amongst the horses. I have had to send fifty-four away the last few days. I think we shall soon be rid of it now. We stayed in a big farmhouse last night, and may be here again to-night. It is a funny thing, but none of these French houses have baths. I have only been able to have one bath since leaving England, and that was in a soft water tub under a spout in a disused brick-yard. I should love to get into a good bath and get into civilian clothes; it will be a treat when it does come.

We take all our food with us on a mess wagon. If we billet at a place for the night we do not have any food with them, only sleep. They often find us a room to have food in, which is cooked by the mess cook outside. If there is no room we have it in the open or under a shed; it is pretty rough cooking, but you are ready to tackle anything.

October 19.—I have had a whole budget of letters from you yesterday, also the parcel containing all the things you sent, which were simply lovely.

Tell the people who are anxious about the horses that we are well supplied with all necessaries by the A.V.C., and the horses want for nothing at present. Of course, it is no picnic for them any more than it is for anyone else, and sometimes they have had to work when they should not; but this is war, and the Germans don't wait till your horses get well. There is a great amount of supervision over the horses, and cruelty is reduced to a minimum, considering all things. Of course, any hopeless cases are at once destroyed. It is the men in the firing line who need all the comforts they can get. They must get terribly cold at night in the trenches, but, as I told you before, they are splendidly fed, which goes a great way to keeping a man warm.

A great friend of our M.O. was killed some little time ago. Two days before he was killed he was recommended for the V.C. Wasn't it rough on the poor chap? The R.A.M.C. have had a very thick time of it. A man named C——, another friend of the M.O.'s, was crossing to a trench to see a wounded man when he was struck by a high explosive shell, and there was not a vestige of him left. Isn't it awful to be clean wiped out like that! We are getting a bit nearer the fighting; we can hear heavy firing to-day. I do hope our troops will soon be able to push those brutes out of Belgium. I hope there will be no more retreating for us. I have not yet seen the Indians; they are coming up into action some time this week, I believe. I hope those little Gurkhas will give them a taste of what they have been giving the non-combatant population. The Germans must be brought to their knees, if it takes years to do it. They, on the whole, are not better than swine.

I think one of the most exciting experiences I had was at S——. In the middle of the night we heard some rifle shots quite close. It appears that some straggling Germans hidden in a wood had fired at one of our sentries; then our men began to fire.

L—— and I rushed out in the dark, and there was a perfect fusillade for some minutes; you could hear the bullets whistling in the dark. We expected one every minute. It is a nasty feeling in the dark. I thought at least we were surrounded and our turn had come. However, it all came out right, and the only damage was a man shot in the leg. In the country we are in now you would think there was no war going on if it were not for the refugees coming away from the fighting district, and the sound of the cannon booming away as I write. I hope the beastly Germans will not get here. I should hate to think of them laying waste this beautiful country and sacking all the nice houses.

I do so enjoy the newspapers you send, especially the *Times*. The *Daily Sketch* sent our men 10,000 cigarettes yesterday. Isn't it good of them? I hope they will be thanked.

October 22.—The country round here looks beautiful, the leaves are just turning, and it is simply lovely. I don't think I told you I have been through the forest of Compiègne twice, once when we were retreating, and then on our upward move. It is the most lovely place I was ever in. There are beautiful roads through it, and the trees are most majestic. Practically the whole of the German Army came through the main road on their way to Paris. As we came back through the forest we camped one night in the middle of it. Large and I slept in our valises under an immense tree just off the road. The stillness in the night was most weird, only broken by the screeching of owls and the distant boom of cannon north of Compiègne.

Compiègne is a lovely place, and the Germans have not knocked it about much; our people blew up a lovely bridge there. As you enter from the north there is a big palace built by Napoleon.

The *Times* is most acceptable, as it always gives such clear accounts of everything. Can you post one or two as soon as you finish with them? Everyone also likes to see the *Sketch* and *Mirror*, and they are nice for the men. I don't think they will use the Territorial artillery out here at present; they say it would be like murder, as these Germans are so deadly in their aim with artillery. I do hope we shall soon be able to cricket them out of Belgium, so that the fighting can take place in Germany, and then we shall see how they like war in their country. I personally think as soon as we begin to fight in Germany they will want peace at any price; so long as their own country is not devastated they don't mind.

We are having now about the quickest and slowest time since we came into the country. We have billets in a large farmhouse. I wish they could get the blighters out of Lille, then I expect we should soon slip on.

October 25.—I wish people could see what I have seen here these last few days, refugees pouring through, not by hundreds, but thousands. God above knows where the poor beggars go and what they live on. They are all old men, women, and

children of all ages; scores of the women are expecting to become mothers. I saw one woman who had seventeen children with her, and she told me they were all her own, and her husband was fighting *à la guerre*. When the men on the convoys give them some of their food the children eat it like wolves. If anyone can see such a sight and not want to fight he is not worth the name of man. I think we must be on the eve of great events at the Front. I do hope it will all be successful. Everyone seems very satisfied with the way things are going, so I hope we shall have no set-backs. When we were billeted at Sarcy for one night some time back I slept on a floor in a house the Germans had been in for four or five days. I found about half a dozen postcards in German. I got them translated. They were all writing to their friends in Germany, and every postcard began "We are now in Paris," and one blighter went so far as to say he was encamped under the Eiffel Tower, and they all said what a lovely place Paris was! They had evidently got them written ready to post as soon as they reached Paris. There is no doubt they were cocksure of getting there. I lent the cards to an officer in the motor transport, and he promised to return them, but has not done so yet.

November 2.—We have been here, F——, since Friday last. We keep creeping slowly northwards. This is rather a larger town. We have our mess at a sort of girls' high school; the headmistress invited us. The M.O. and I sleep at the senator's house; it is lovely to be in a bed again. It is one of those big old-fashioned houses in the middle of the town facing up to the street.

There is some heavy fighting going on. I do hope we beat them back, as it would be cruel to have to retire again. I should think it is a very crucial time for both sides just now, but we must hope for the best. I think our men in the trenches must be fighting like heroes. I think the Germans, sooner than have the French, Belgians, and Russians over their own land and homes, will accept almost any terms of peace. If the French and Belgians once get into Germany, I am afraid there will be some frightful havoc; they are sure to get out of hand after all they have suffered in their own homes. You can tell what they feel like when talking to them—it is rage smouldering, and when it breaks out I think it would be awful.

We get very good bacon issued to us for breakfast. Yesterday we had bully for lunch and curried bully for dinner. I expect it will be Irish stew bully for dinner to-night. The bully beef is very good; no one need grumble as long as they get plenty of that and bread and cheese. We drink a big lot of tea; we have it at every meal; it also is a Government issue.

November 5.—We are still in the same place. I don't think we shall move far until they can get a good move on. The fighting at the Front is terrific. I am glad the first Territorial lot to go into action did so well. I believe they covered themselves with glory against some of the Kaiser's picked troops. I believe

their losses were 300 killed, wounded, and missing, which is comparatively very small considering what they did. I wish we had got about another half million good men to put in the field against those blighters, and I think that would soon make short work of the war; any way, so far as Belgium is concerned.

The ladies at the school we are staying at are teaching our cook some French cooking, so we are doing very well now in the way of feeding. It is all right here, but I shall be glad when we get a move on, as the sooner we get going the sooner we shall be home. The other day I was riding along the road with Captain E—— just at dusk, and a small farmer came out on the roadside and said two Germans were behind his house. E—— jumped off his horse and chucked the reins to me, and was after them like a shot. They bolted into a wood close by, and he went after them; then I heard a revolver shot, but after about five minutes I was glad to see him come back. He had fired at their legs, but missed them, so had to give up the chase. It takes a bit of pluck to rush into a wood like he did. It all happened before I knew what he was up to. He simply chucked the reins to me, never said a word, and bolted for them like a greyhound. This was some weeks ago when we were coming from the Marne.

November 10.—A funny thing happened here the other day. I met a Frenchman in the street, and he said, "I know you," and I knew his face. He was a refugee from Lille. He was a horse-dealer there, and he had met me at Crewe and Derby. He is hoping to get back in a few days.

November 15.—The 8th Division are not far from here; all their motor transport has been coming through this town most of the week. There is not much news, as most days are spent in the same way—getting ready and keeping fit for the next big move. I shall be glad to get the pipes and tobacco, although we get a ration issue of tobacco each week. We can get matches now all right, but later on I should like you to send me some safety boxes. Many of the men, I am sure, are living better than when they are at home, and they have just had issued to them new socks and shirts, and new khaki and boots. It is the poor beggars who are actually in the trenches who want all the comforts, &c., they can have.

November 16.—I wish we could get a move on. The time goes rather slowly here, and one feels we are doing nothing, while the men in the trenches are having such a frightful time.

I saw that article about the war lasting three years. Neither side could possibly stand it at the present rate of losses. I think about another six months and the Germans will have had enough. I cannot see how their resources can possibly hold out longer, attacked as they are from both sides.

There are a great many dreadful tales with regard to the treatment of the French and Belgians; some, no doubt, are true, and some, I expect, are very much exaggerated: and yet, if they (the Germans) will do the things which have been told to me by

people who were present, then I should say they are capable of committing excesses which would make animals and savages blush. At Bettissy St. Pierre a tradesman in the village told me that when the Germans came through with their army (it took them ten days going through on their way to Paris—there were over 200,000 men on that route alone) they had in front of the troops marching twenty-five civilians (old men, women, and children); one woman in the street just below the house we were then sitting in was in front of the troops, and was leading two children, one by each hand, their ages about 6 and 8. The woman was shot clean through the stomach, and she lived a day or two, and the children are now motherless. Also, they ravished every young girl in the place, and some of them died or were killed. At Château Thierry these "gentlemen of Kultur" did things . . . which sound impossible, but the French people who told us, I should think, were telling the truth, by the frightfully sad and dejected manner in which they spoke. Can it be true? And yet these people seem quite genuine. I hope there will be an inquiry after the war, and if they are true the Germans must always stink wherever white men live.

I think that note which Lord Kitchener issued to the troops before leaving England did a lot of good. I must say I have never seen anything but the most courteous conduct by any of our men both to women and children.

November 25.—I am afraid I shall not get your letters so regularly now, as the motor-lorry which has been coming out here every day is only coming twice a week now, so that we can only receive or send letters twice a week instead of every day as we have been able to do this last three weeks. It snowed all day yesterday; there is about 3 in. of snow on the ground, and there were 10 degrees of frost last night, so you can imagine what the roads are like. It is a beautiful, sunny, frosty day to-day, so one does not feel the cold a bit. It is awful to think of the poor beggars in the trenches and doing outpost duty on a night like last night. Even yesterday, although it snowed hard all day, the boom of cannon went on incessantly.

The other park that was stationed here with us has been moved eight miles away, because two new parks of Kitchener's Army have come out from England, and one has had to come here under our major, and the other under the major of the other park, as the new parks are fresh to the work and have to be under the wing of one that knows its job well. The reason the other park had to move from here was because there is not room in a small town for more than two parks, and we eat all the fodder and drink their water dry—over 700 horses and wagons take up an awful lot of room. One park on the march stretched for nearly a mile on the road. One feels quite an old campaigner when these new fellows came out; they will never see what we saw, nor, I hope, will ever know what a retreat is like. I hope I shall never have such an experience again. We sometimes come across some of the troops that had been fighting and had

got separated from their units. They looked awful—footsore, unshaven, hungry, and thirsty, and had a hunted look about their eyes you could never forget when you had once seen it. I shall never forget coming across about thirty of the West Kents; they had been travelling two days and two nights without food or rest; they looked awful; but when I come home I will tell you one or two most magnificent actions those men did one for the other. I don't think people realize how near the British force was to being wiped out in those last days of August.

My friend —— here has opened my eyes for me. I shall be able to tell you all about the first days of the war when we meet.

Translation.

WOUNDS IN GERMAN ARMY HORSES.

By EBERLEIN.

THESE have been very frequent. Large wounds have been sutured, contused ones regulated and treated as open lesions. Eberlein praises the mechanical disinfection procedure used by him for some years, which consists in having the wounds carefully rubbed dry, freed from hairs and painted with dilute tincture of iodine or mastisol, and covered with a tampon. Never was washing or syringing out of wounds performed even, although they were soiled. Healing and recovery were remarkable, and in this connection mastisol showed itself superior to tincture of iodine. Very purulent superficial wounds and ichorous and necrotic wounds were successfully dealt with by the use of lenicet (a preparation of aluminium sulphate), lenicet talc. and iodine, and lenicet powder. Pyoktanin has also been largely used. On injuries due to blows in the region of the tibia, radius, and joints, mastisol painted on has produced good results.

Saddle and harness sores were very frequently the result of new and badly fitting gears, too small collars, and great leanness of the neck and back as a result of severe exertion. Also remaining harnessed all day long and faulty skin hygiene helped their occurrence.

Since the animals, in spite of watchful and timely treatment, owing to the quick travelling of the troops could not be spared, the severest necrotic processes were met with on the fascia, the neck ligaments, the spines of the vertebræ, and even the shoulder-blade. Nevertheless, septicæmia seldom occurred, and slaughter was only necessary in isolated cases. Cases of traumatic laminitis were very numerous and caused by over exertion (long, continuous marching, ordnance, and patrol rides), and they were often accompanied by symptoms of colic. Timely copious bleeding and injection of arecolin had good effects. Unfavourable complications were rotation of the os pedis and necrosis of the sensitive foot.

Suppurative and gangrenous pododermatitis occurred in a few

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cases, chiefly as a result of bullets, treads, and picked up nails, as well as laminitis, and three cases of fistula of the lateral cartilage.

Treads, and wounds from picked up nails after being opened up, were treated by painting with mastisol or tincture of iodine, and a twill plaster put on. Despite deep nail penetration, healing without pus formation took place in ten days. A severe injury of the flexor pedis perforans healed when treated thus quite unexpectedly. A horse with a perforating wound of the fetlock joint, and another with a wound of the flexor pedis perforatus, were also healed with mastisol.

Injuries from infantry shots were very numerous, and were treated favourably with mastisol and tincture of iodine. Unnecessary palpating, exploring, and washing were never undertaken.

Remarkable effects were caused by aerial bombs. Even small pieces of the bomb caused severe wounds. Three soldiers and seven horses of an ammunition column were killed by a single bomb. Although striking the earth 100 metres away fatal results to men have been noticed.

Injuries from aerial darts were not numerous, but very severe when they occurred. In one case a dart went through the pommel of the saddle and a ninefold thick saddlecloth and into the muscular tissue of the shoulder.

As regards shoeing, shoes lasted on an average four weeks. The supply of shoeing iron was scarce, and substitutes had to be provided. The shoeing-smiths were insufficient in number and badly organized.—*Swiss Journal of Veterinary Medicine.*

G. M.

Reviews.

Text-book of General Therapeutics for Veterinarians. By E. Fröhner, Professor of Pathology and Therapeutics, Berlin. Translated by Louis A. Klein, Professor of Pharmacology and Veterinary Hygiene, University of Pennsylvania, and Dean of the Faculty. Published by J. B. Lippincott Co., Philadelphia and London. Price 12s. 6d. net.

This book has gone into its fourth edition. It forms good reading, and is one of the few publications that makes the science of therapeutics interesting to the reader. It is up to date. Protective vaccination, which has developed so much in the last decade, is concisely and adequately discussed and explained. The general therapeutics applicable to the various parts of the body is indicated, and the oral and subcutaneous methods of using drugs and their doses are given. The German regulations governing disinfection have been included in the translation and are instructive and applicable to a large extent here.

In the descriptions of the therapeutic uses of the individual drugs the names used in the U.S.A. Pharmacopœia and in the U.S.A. Dispensatory have been employed. Air, water, and

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massage are discussed as remedies in disease, and the author acknowledges his indebtedness to human medicine for many of the methods he advocates. The work is well indexed, and comprises 296 pages of letterpress. The translation is a good one, and any veterinary surgeon who takes a special interest in therapeutics may obtain much valuable information from a perusal of the volume. By reason of the way the book has been compiled students, too, can peruse it with pleasure and profit.

G. M.

The Journal of the Board of Agriculture for February, 1915. Price 4d. monthly.

This periodical, among other interesting matter, contains three articles of outstanding merit, namely: "The Cultivation of Sugar Beet in Norfolk and Suffolk," by C. S. Owen, M.A., and J. Orr, M.A.; "Flax Growing," and "Manufacture of Charcoal." Some valuable information is given on "the growing of spring wheat," which, considering the great amount of wet weather we have had, and the urgency of the matter of increasing the wheat area, is particularly appropriate. The value of soot as manure and to improve the warmth or texture of soils is indicated in a short note on the subject. Other articles in the journal are those on "The Cultivation of Chicory" and "Coco-nut Cake and Palm-nut Kernel Cake." This month's number well maintains the standard of merit observable in the literary department of the Board of Agriculture. G. M.

Text-book of Milk Hygiene. By Dr. William Ernst, Official Veterinarian and Director of the Royal Milk Control Station at Munich. Translated by Dr. John R. Mohler, A.M., V.M.D., and Dr. Adolph Eichhorn, D.V.S. With Appendix containing laws regulating the Production and Sale of Milk in the British Isles, by G. Mayall, M.R.C.V.S. Publishers: Messrs. Baillière, Tindall and Cox, 8, Henrietta Street, Covent Garden. Seven coloured plates and 29 figures. Price 15s. net.

The importance attached to a clean milk and the danger of its contamination at its source, during transit, or before it reaches the consumer's mouth, render a book devoted solely to the *tout ensemble* of the obtaining of a pure supply very valuable. In order to be a competent adviser in the matter the veterinary surgeon and the sanitary expert must have an intimate knowledge of milk, its formation, procurement and characteristics and any conditions which change it in the animal body or after it has been obtained. This volume leaves no gap in the circle or field of knowledge surrounding the subject.

The anatomy, pathology and histology of the mammary gland, the physiology of lactation, the microscopy, composition, biology, chemical and physical characteristics of the lacteal fluid are all fully discussed. The proper hygiene attached to the procurement of a clean supply of milk, and the internal and external influences that act upon the lacteal fluid, are adequately dealt with.

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Chapters on the bacteria in market milk, milk control and milk inspection, follow, and the work is completed by an appendix on the laws regulating the production and sale of milk in the British Isles, by G. Mayall, M.R.C.V.S. Municipal veterinary surgeons especially will find in the book a guide and friend. It is essentially a veterinary surgeon's manual, and the author's intention in writing the book is well indicated in the following words : " In the field of production veterinarians are the proper experts, who must stand by the side of the producers and give them the necessary advice and instruction. Only by the active and expert aid of veterinarians can it be hoped to improve the goodwill of the producers."

The get up and printing of the text-book are excellent, and the illustrations are splendid.

In connection with the question of over-stocking it is interesting to note that—" The nerves of the udder originate from the lumbar plexus. The udder is supplied by the internal branch of the ileo-hypogastric nerve, the external branch of the lumbo-inguinal nerve and the external spermatic nerve."

Diseases of Swine. With particular reference to Hog Cholera. By Charles F. Lynch, M.D., D.V.S., of Terre Haute Veterinary College, Indiana. Octavo, pp. 741, with 120 illustrations. Cloth 21s. net. Publishers : W. B. Saunders Co., 9, Henrietta Street, Covent Garden, London, W.C.

This is the largest volume on the subject that we have yet seen produced either in this or any other country. The work commences with an interesting description of the breeds of pigs met with in America. Its chief value undoubtedly depends on the masterly exposition given of the history, distribution, occurrence, prevention and combating of hog cholera. Just over 400 pages are devoted to a consideration of the disease. The cause of cholera and the danger of infection from the animal emanations are lucidly set forth. In connection with the vitality of the virus it may be noted that the author states that hog cholera pens may remain dangerous for at least a year after the occurrence of the last case of the disease therein, but proper hygienic measures conducted after an outbreak tend to shorten this period. Cases are quoted to show that the virus is not destroyed by the freezing weather in Iowa in the winter months, and especially not so if protected by a thick layer of mud and refuse. Repeated disinfection, fresh earthing of the pens, and burning all refuse are safeguards not lightly to be omitted. A solution made of 50 gallons of water, 1 gallon of crude carbolic acid and 5 lb. of laundry soap is recommended as a spray for disinfecting pens and chloride of lime is stated to be the best floor disinfectant.

The predisposing causes of swine fever are connected with age, sex, pregnancy, breed, geographic location, feed lots, water supply, unbalanced rations, &c. The danger of infection from kitchen, restaurant, and hotel refuse is indicated ; so important is this matter considered that in Canada no compensation is allowed for pigs slaughtered by inspectors' orders, where it is found that the owner has been feeding hotel or kitchen refuse.

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The proper way to dispose of dead animals is to burn them. This is especially important in a country where animal scavengers and beasts of prey abound. The danger of leaving carcases about on the farm is specially indicated from the fact that virus carriers, like buzzards and crows, will often come from as far as 100 miles to feast on an exposed animal carcase. Chicken cholera is said to be frequently the precursor of hog cholera and an outbreak of the latter is ascribed to the throwing out of dead fowls into the field or along the hedge fence, to be eaten by other animals. Dogs also assist in spreading infection and Dr. Lynch asserts that he has frequently encountered dogs crossing the road from an infected pasture with a bone or other remains of some dead cholera animal, and invariably he could count on receiving after a few days a notice of cholera on the farm which was the home of the dog.

Rules for making *post-mortem* examinations, lesions found, and incubation period of the disease are all fully discussed. The turkey egg spotting of the kidney seems to be an almost constant lesion of hog cholera in America. Types of cholera, symptoms and diagnosis are well described and full instructions as to treatment of the complaint by means of serum follow. Serum when used alone confers protection for about six weeks. *The double method of treatment by serum and virus blood bestows immunity for life.* In the hands of a competent man it is just as safe as the single treatment. Clinical evidence of the value of the procedure is proved by the relation of the effects of inoculation in forty-seven herds and shortly the author declares that "the injection of a double dose of serum and virus not only will not produce the disease, but it will result in the development of a permanent protective power against invasion by cholera germs."

The other diseases of swine (infective and general) are discussed in 212 pages of the book. It is news to us to learn that swine erysipelas is not seen in hogs in the U.S.A., and swine plague, too, is said to be absent. Tuberculosis in swine is concisely and knowingly dealt with. The intradermal test for tuberculosis is something new. It consists in shaving the hair off a small area on the skin and injecting a drop or two of the test-fluid between the layers of skin, *not under the skin.* The animal is then left undisturbed for 12 to 24 hours and the spot then examined. If a positive reaction occurs the area round the point of injection will be found to be reddened and inflamed. If no tuberculosis the spot will be natural in colour. Pages amounting to 132 on the diseases of the digestive and respiratory tracts, kidney, bladder, heart, skin, nervous system, organs of locomotion and generation, parasitic and surgical diseases follow and the volume concludes with articles on castration and spaying of porcines, by Dr. George R. White. In reference to the treatment of some of the general diseases of swine the author seems to have a noticeable fondness for the use of castor oil and calomel, and to recommend them rather indiscriminately. We fail to see any special virtue in repeated doses of castor oil to swine with pneumonia and have always had fair results with medicine such as sodium hyposulphite, pot. nit., Glauber's salts, that can be given, and will be taken naturally in milk. Again, in cases of pneumonia, stimulation of the

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sides is valuable, but is not mentioned, and instead of "putting a blanket over a sick animal" (which is likely to stop on effectively for about three minutes) we prefer, and have had success from cutting two holes in a piece of old blanket or horse-rug, putting the pig's forelegs through it and stitching it (so that it comes up to the chest) along the withers and back, covering the chest region and so making a jacket for the patient. The steaming of pigs' nasal organs for catarrh by means of medicated inhalations is a measure likely to be very indifferently carried out, and unless labour is plentiful, very impracticable. Good enough results will be brought about by pure air, warmth, warm food, and the use of the remedy that has gained a big reputation in these cases, viz., a mixture composed by weight of 1 part of ammonium chloride, 1½ parts of liquorice powder, and 2 parts of sodium sulphate. Dose, a teaspoonful to a dessertspoonful two or three times daily, well mixed with the food. In diarrhœa in pigs, calomel followed by castor oil is worse than useless, in our opinion. We prefer a mixture of bismuth and salol, and commence giving it at once, especially in young pigs.

The author does not touch on the causes of fully developed dead-born progeny, or give his reasons for sows eating their young, or any measures to check the evil habit. We should have liked to read his opinions on these all-too-frequent troubles. In discussing the surgical measures for prolapse of the rectum no instructions are given as to its amputation. In over 90 per cent. of cases of prolapse we have attended, amputation has always been necessary.

The book is well illustrated and bound. As regards the infectious diseases of swine it marks a great advance on anything hitherto written in the Anglo-Saxon tongue. If the author's statements with regard to the use and value of protective inoculation in hog cholera are at variance with the authoritative pronouncements given in this country as to the effect of the treatment in America, yet one cannot disregard the fact that they are the favourable opinions of a capable American veterinary surgeon given after sifting, weighing, and estimating the evidence for the use of inoculation, and after large and extensive practical experience in the technical detail of the subject.

G. M.

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